

## REMARKS

### A. Introduction

Claims 1-16 were pending and under consideration in the application.

In the Office Action of May 24, 2011, claims 1-16 were rejected. With this amendment, various claims have been amended (see, e.g., paragraphs 0022-0039, 0047 of the published application for support). Claims 2 and 5 have been cancelled.

### B. Rejection under 35 USC §103

Claims 1-10 were rejected under 35 U.S.C. §103 as unpatentable over Koitabashi (U.S. Patent No. 6,612,691) ("Koitabashi") in view of Hirose (U.S. Patent No. 5,591,514) ("Hirose") with reference to the IEEE and ASTM Dictionary for the definition of room temperature.

Claims 11-16 were rejected under 35 U.S.C. §103 as unpatentable over Koitabashi in view of Hirose and in further view of Koitabashi (U.S. Pat. Pub. No. 2002/0097290) ("Koitabashi 2") and Sakaki (U.S. Pat. No. 6,174,056) ("Sakaki").

Applicant traverses these rejections for at least the following reasons.

Claim 1, as now amended, is directed to an ink-jet recording method and, *inter alia*, recites the features of: "discharging successive ink droplets using a line head ink-jet printer configured such that an interval between a discharge of a droplet of an ink of a first color and a discharge of a successive droplet of an ink of a second different color is 50 msec to 200 msec," where "using said line head ink-jet printer includes:

using inks having a surface tension of 25 to 45 mN/m at 23°C for said inks of each color, and

using a recording material, onto which said ink droplets are discharged, that (i) has an ink absorption amount in 100 msec of 15 mL/m<sup>2</sup> or more, and (ii) includes at least one of (a) a coated paper having a porous coating layer, (b) a glossy paper having a glossy recording surface, and (c) an OHP recording sheet each having a porous coating layer on a transparent base material.

Claim 4, directed to a line-head ink-jet printer, now similarly recites such features.

Koitaishi and Hirose, separately or in combination, do not teach or fairly suggest an ink-jet recording method and a line head ink-jet printer that have a combination of all of the claimed features.

In the Office Action, with respect to claims 2 and 5 (now cancelled), the Examiner noted that in Figure 20 (shown below), Koitaishi teaches a line head type of printer ("full-line recording apparatus").

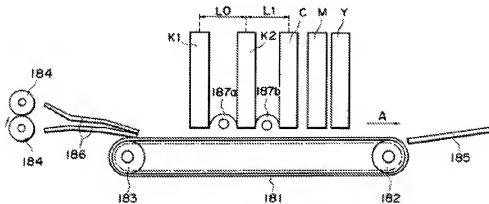


FIG. 20

However, in connection with this figure, Koitaishi teaches, at col. 22: 58 to col. 23: 15, that:

"In FIG. 20, a referential code L0 designates the distance between the two recording heads for ejecting black ink. Setting the value of the distance L0 based on the length of time it takes for a recording sheet to travel this distance L0 fixes the length of the interval in time between the times at which the recording should be made by the recording heads K1 and K2 for ejecting black ink. In other words, if the interval in time between the time at which the first recording is made by the recording head K1, and the time at which the overlapping second recording is made by the recording head K2 is set at 1.5 seconds, **L0 should be set to a distance that can be traveled by a recording sheet in 1.5 seconds.** Further, in the case of the structure illustrated in FIG. 20, a distance L1 between the recording head K2 for ejecting black ink, and the recording head C for ejecting cyan ink, is set to be substantially equal to the distance L0, so that an interval in time is provided before the

**recording head C begins recording after the recording head K2 finishes recording.** With this structure, the recording by the recording head C begins after the ink droplet ejected from the recording head K2 has penetrated into the recording sheet to a certain depth, and therefore, the borderline ink spreading between the area recorded with the black ink and the areas recorded with the color inks is well controlled. As a result, desirable images can be recorded." (Emphasis added).

Thus, at least with respect to an interval between ejecting a black ink and a cyan ink, the interval is set to 1.5 seconds, which is clearly inconsistent with the requisite interval of 50-200 ms of the claimed line head ink-jet printer.

Further, Koitabashi is silent as to intervals between a discharge of successive droplets of other colors of ink held in the recording heads C, M, Y, and only graphically shows relative distances between those heads. At best, those distances/intervals look shorter, but it is not clear what *exactly* those intervals are, and thus this alone cannot be fairly viewed as disclosing the claimed interval of 50-200 ms. Further, as noted above, the interval at least between a black ink and a different colored cyan ink is inconsistent with the claimed invention.

Koitabashi further teaches a split injection system in which a single color using two smaller ink droplets are discharged at an interval of 50 msec as opposed to discharging a single larger ink droplet. See, e.g., Koitabashi, Col. 12-13.

At best, in one of the portions noted by the Examiner, at col. 18, Koitabashi teaches "[r]ecording with a short interval between split ink injections" and merely notes that "[t]he interval between the times at which the black ink ejecting portions K1 and K2 eject ink was set at approximately 50 msec, which was relatively short. The recording processes by the color ink ejecting portions C, M and Y were carried out following the scanning movement of the black ink ejecting portions K1 and K2." Col. 18, lines 45-50.

Aside from this, the description of Figure 20 (see col. 21:59 to col. 23: 15) in Koitabashi does not teach any specific properties of inks and recording materials that would be used in connection with the disclosed full-line printer, much less teaching using inks having the requisite surface density of 25-40 mN/m at 23°C for inks of each color used in a line head ink-jet printer that is (i) "configured such that an interval between a discharge of a droplet of an ink of a first

color and a discharge of a successive droplet of an ink of a second different color is 50 msec to 200 msec" and (ii) is used with a recording material "that (i) has an ink absorption amount in 100 msec of  $15 \text{ mL/m}^2$  or more, and (ii) includes at least one of (a) a coated paper having a porous coating layer, (b) a glossy paper having a glossy recording surface, and (c) an OHP recording sheet having a porous coating layer on a transparent base material.

Further, Applicant respectfully notes that the properties of a semi-penetrative ink disclosed in Koitabashi are with respect to *a plain paper* rather than recording materials other than plain paper, and particularly, such as those presently claimed. In this regard, please see, e.g., "Abstract" where Koitabashi teaches that "the ink has an ink absorption coefficient  $K_a$  ( $\text{mL.m}^{-2}.\text{msec}^{-1/2}$ ) relative to a plain paper, defined by Bristow method, is 1.0-5.0 and satisfies  $0 < t_s \leq 200$  msec where  $t_s$  is a rapid expansion start point." Please also see various test examples described in Koitabashi in which a recording apparatus uses an "ordinary sheet."

In contrast, the claimed invention envisions using also recording materials other than plain paper, such as materials used in photographic printing, and in particular other materials in which an amount of ink absorption in 100 ms can be as claimed. See, e.g., par. 0047 of the specification.

Hirose then, for instance, teaches an improved recording paper, where "[a] recording paper comprising pulp fibers and a filler has a surface where pulp fibers bared to the surface and pulp fibers covered with particles are present together in portions," and, at best, teaches recording on "the recording paper of the present invention" using inks with low surface tension (25 to 35 dyne/cm)" (and hence 25 to 35 mN/m). See Abstract and col. 5, lines 35-43.

Further, the Examiner noted that Hirose, for example, provides test examples of a longer shoot time interval than 18 msec, i.e., 30 msec, between adjacent dots with different colors. Office Action, page 14. See also results summary, at col. 21, of the test examples in which "the minimum ink-shoot time interval ( $T_1$ ) for adjacent dots is 30 msec." The Examiner thus concluded that Hirose is not limited to those intervals. Office Action, page 15.

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However, even if so, Hirose does not specifically address line head type of ink-jet printing, and in particular, using inks having the requisite surface density of 25-40 mN/m at 23°C for inks of each color used in a line head ink jet printer that is (i) "configured such that an interval between a discharge of a droplet of an ink of a first color and a discharge of a successive droplet of an ink of a second different color is 50 msec to 200 msec" and (ii) is used with a recording material "that (i) has an ink absorption amount in 100 msec of 15 mL/m<sup>2</sup> or more, and (ii) includes at least one of (a) a coated paper having a porous coating layer, (b) a glossy paper having a glossy recording surface, and (c) an OHP recording sheet having a porous coating layer on a transparent base material, as recited in various ways in at least claims 1 and 4.

Claims depending from independent claims 1 or 4 include all of the limitations of these claims, and are allowable for at least the same reasons.

#### **C. Conclusion**

It is respectfully submitted that a full and complete response has been made to the outstanding Office Action and, as such, there being no other objections or rejections, this application is in condition for allowance, and a notice to this effect is earnestly solicited.

If any further fees are required in connection with the filing of this amendment, please charge the same to our Deposit Account No. 19-3140.

Respectfully submitted,  
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